CLAIMS:

1. A non-contact method for determining a tension in a target strand, comprising the steps of:

providing a plurality of radiation detecting elements each arranged to provide an output signal for indicating a level of radiation incident at a respective detecting element;

detecting radiation incident at said plurality of detecting elements when said strand vibrates;

repeatedly identifying one or more detecting elements providing an output indicating a predetermined characteristic; and

determining the tension in said strand responsive to which of said detecting elements are identified.

2. The method as claimed in claim 1 further comprising the steps of:

providing a radiation source to illuminate a portion of said strand; and

detecting radiation reflected from said strand.

3. The method as claimed in claim 1 further comprising the steps of:

providing a radiation source to illuminate a portion of said strand; and

detecting radiation un-obscured by said strand.

4. The method as claimed in any one of claims 1 to 3 wherein said step of repeatedly identifying comprises the steps of:

detecting a level of incident radiation at all of said plurality of detecting elements;

identifying which of said detecting elements from all of said plurality of detecting elements, has the highest level of incident radiation; and

repeating the steps of detecting a level of incident radiation at all of said detecting elements and identifying said highest level of incident radiation detecting element over a period of time.

5. The method as claimed in any one of claims 1 to 3 wherein said step of repeatedly identifying comprises the steps of:

detecting a level of incident radiation at all of said plurality of detecting elements;

identifying which of said detecting elements from all of said plurality of detecting elements has the lowest level of incident radiation; and

repeating the steps of detecting a level of incident radiation at all of said plurality of detecting elements and identifying said lowest level of incident radiation detecting element over a period of time.

6. The method as claimed in claim 4 or 5 further comprising the steps of:

providing an output indicating the position of an identified detecting element over said period of time; and

determining a frequency associated with a change in position of said identified element.

7. The method as claimed in claim 6 further comprising the steps of:

calculating said tension according to the equation

$$T = \rho\left(\frac{2\ell f}{n}\right)^2$$

where T is the tension in the strand, ρ is the linear density of the strand, l is the distance between two points of the strand, f is the natural frequency of vibration and n is an integer value corresponding to the mode of vibration of the strand.

8. The method as claimed in any one of claims 1 to 7 further comprising the steps of:

supporting said strand at two spaced-apart locations via a pair of guide supports.

9. The method as claimed in claim 8 further comprising the steps of:

generating a vibration of said strand by running said strand in a direction parallel to a main axis of the strand and across guide supports arranged substantially perpendicular to the direction of running.

10. A method as claimed in claim 8 further comprising the steps of:

generating a vibration of said strand by displacing a portion of said strand away from a resting position and permitting said strand to recover to the resting position.

11. The method as claimed in any one of claims 2 or 3 further comprising locating said strand at a desired location with respect to said plurality of detecting elements prior to determining said tension.

12. The method as claimed in claim 11 further comprising the steps of:

providing two or more radiation sources and locating said strand at said desired location by the steps of:

locating said plurality of detector elements at various locations with respect to said strand;

detecting when an intensity of reflected or transmitted radiation reaches a predetermined level;

selecting a position for said plurality of detector elements when the intensity reaches said predetermined level; and

locating said plurality of detection elements at said selected position.

13. Apparatus for determining a tension in a strand comprising:

a plurality of radiation detection elements each for providing an output signal responsive to a respective level of incident radiation;

means for identifying one or more of said detecting elements providing a respective output indicating a predetermined characteristic; and

means for determining the tension in said strand responsive to which of said detecting elements is identified.

14. The apparatus as claimed in claim 13 further comprising:

a radiation source for illuminating a portion of said strand.

15. The apparatus as claimed in claim 13 further comprising:

a lens for focussing radiation onto said radiation detecting elements.

16. The apparatus as claimed in any one of claims 13 to 15 wherein said means for identifying comprises:

a comparator arranged to consecutively compare the output from the plurality of detecting elements with a repeatedly updated previously stored value and provide an enable signal to indicate when a detecting element provides a respective output indicating said predetermined characteristic.

17. The apparatus as claimed in claim 16 further comprising:

a data store arranged to store the repeatedly updated value.

18. The apparatus as claimed in claim 17 further comprising:

a counter arranged to output a running digital count signal, each value of said count signal indicating a respective one of said detecting elements.

19. The apparatus as claimed in claim 18 further comprising:

a latch arranged to receive said count signal and said enable signal and to output a count value responsive to said enable signal.

20. The apparatus as claimed in any one of claims 13 to 19 wherein said means for determining the tension comprises:

a frequency analyser for receiving a signal indicating said one or more identified detecting elements and, from said signal, determining a frequency of vibration of said strand.

21. The apparatus as claimed in any one of claims 13 to 20 wherein said strand comprises a tensioned yarn.

22. The apparatus as claimed in any one of claims 13 to 20 wherein said strand comprises a textile yarn.

23. The apparatus as claimed in any one of claims 13 to 20 wherein said strand comprises a running strand.

24. The apparatus as claimed in any one of claims 13 to 23 wherein said plurality of radiation detecting elements comprises a charge coupled device (CCD) or photodiode type linear array.

25. The apparatus as claimed in any one of claims 13 to 24 wherein said radiation source comprises one or more light emitting diodes.

26. A method substantially as hereinbefore described with reference to the accompanying drawings.

27. Apparatus constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.